

Forest Health Protection

Pacific Southwest Region



Date: May 15, 2002

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To: District Ranger, Big Valley Ranger District, Modoc National Forest

Subject: Partial cutting ponderosa and Jeffrey pine stands infected with black stain root disease (FHP #NE02-03)

Issue Statement:

This paper is prepared as a response to the black stain root disease (BSRD) issue that was initiated by the comment received at the Big Valley Ranger District from the public on January 30, 2002. The commenter disagreed with the proposed partial cutting for pine stands containing trees infected with BSRD. Specifically he did not think the best scientific information supported any partial cutting treatment as a way to effectively limit the spread and mortality from black stain.

Response:

Much is yet to be learned about BSRD on PP and JP. Under some conditions, partial cutting appears to increase the incidence and/or the severity of the disease, while under other conditions, the disease seems to be unaffected by partial cutting. There is scientific information stating that partial cutting can either increase or decrease the incidence of BSRD in a pine stand depending on a number of variables associated with the thinning:

- The amount of soil disturbance that occurs

NORTHEASTERN CALIFORNIA SHARED SERVICE AREA
2550 RIVERSIDE DRIVE SUSANVILLE, CA 96130
530-257-2151

Sheri Lee Smith
Supervisory Entomologist

Danny Cluck
Entomologist

William C. Woodruff
Plant Pathologist

- The time of year the partial cutting is performed
- The amount of host-to-host root contact that remains
- The amount of tree damage inflicted upon residual trees

As stated in the FPM Evaluation #NE00-25, dated December 28, 2000:

‘Reducing the stocking of the pines throughout the Heart Rock area will accomplish three things which can reduce black stain mortality. First, the health and vigor of the residual pine trees will be enhanced, making these trees less attractive to the root feeding beetles that vector black stain root disease. Second, there will be less root contact between trees, reducing the tree-to-tree spread of the disease should a tree become infected. Third, the open stands will have warmer soil temperatures which may inhibit growth of *Leptographium wageneri*. Of course, the further the trees are spaced apart (ie. the more aggressively the stand is thinned), the more each of these three factors will reduce black stain root disease in the stand.’

The publication (referenced in NE00-25), Tree Notes # 25 (July 2000), “Black Stain Root Disease of Ponderosa Pine in California” by Donald R. Owen discusses partial cutting in BSRD infested stands. Some key management considerations are presented in this publication:

- Any attempts at control of BSRD must be considered experimental
- Even though we can remove infected trees, we currently cannot keep *L. wageneri* vectors from initiating new infections
- Higher than normal stocking increases the risk of BSRD
- Reducing stocking may contribute to disease resistance in a stand because
 - Uncrowded trees are more vigorous and less attractive to *L. wageneri* vectors
 - Open stands will have warmer soils; high temperatures inhibit *L. wageneri*
- Thinning young stands is preferred and it may be best to avoid thinning old stands
- Repeated stand entries, especially during spring months, when vectors are active and when soils are more subject to compaction, may encourage BSRD
- Indications are that thinning pure pine stands, early in their life, using logging precautions, will reduce the probability of BSRD

One management consideration in Owen’s publication which suggests that partial cutting the pine stands in the Heartrock area may increase BSRD is found in Owen’s statement: ‘Thinning older stands, e.g. 30 years and older, is not recommended since the site disturbance in these stands can promote disease.’ One of the citations used in Owen’s publication (Kliejunas, 1992) discusses BSRD in the Stateline Timber Sale area of the Modoc National Forest. In his report, Kliejunas states: ‘Significant site disturbance was evident in some areas. The amount of site disturbance and the degree of black stain appeared to be correlated, with more disease in areas with soil disruption. Some acres had equipment on them three, some four, times.’ Kliejunas reported that two partial cut timber sales near the Stateline Timber Sale were generally free of BSRD. Both of these nearby sales had much less soil disturbance than the Stateline Timber Sale. It is likely that the amount of soil disturbance caused by harvest operations has more effect on the amount of resulting BSRD than the age at which a stand is thinned since all three stands were old and only the stand with heavy soil disturbance was infested.

In the book, *Leptographium Species: Tree Pathogens, Insect Associates, and Agents of Blue Stain*, published in 2001 by the American Phytopathological Society, Jacobs and Wingfield state the following about management strategies for BSRD:

‘Disease management strategies may include replacement of old trees with more vigorous trees that are less prone to attack by bark beetles, spacing of trees to prevent spread through root contact, planting mixed stands, minimizing stand and site disturbance and selection of disease-resistant trees. Sanitation through the removal of diseased trees or chemical treatment has also been suggested.’

The BSRD management objectives for the Heartrock area are:

- Remove the diseased or otherwise weakened trees
- Increase the vigor of the residual pine trees over a large area by leaving the trees lots of growing space. This will reduce their attraction and susceptibility to *L. wagneri* vectors and other bark beetles, especially during periods of below normal precipitation.
- Eliminate root contact between pine by leaving them widely spaced. This will block tree-to-tree spread of BSRD through the roots.
- Leave widely spaced trees so that more soil will be heated by solar radiation to temperatures which inhibit the growth of or kill *L. wagneri*.
- Harvest in a manner that minimizes soil disturbance and injury to the roots and boles of the residual trees. Burn logging slash in place, instead of piling it to reduce soil disturbance.
- Where possible, leave trees that are not hosts for BSRD.
- Limit harvest operations to July and August to avoid times when the *L. wagneri* vectors are most active. Winter logging is acceptable if soil compaction can be avoided and injury to residual trees can be controlled.
- Aggressively thin during each entry and leave grossly understocked stands. This will reduce the frequency of harvest entries and the associated soil disturbance. The greater the distance established between host trees, the more root contacts will be eliminated.
- Reintroduce frequent low intensity ground fires into the landscape. This will prevent excessive ingrowth of brush or conifer regeneration which can create host-to-host root contacts and stress host trees, making them more susceptible to BSRD vectors and BSRD.
- Monitor for post-harvest BSRD activity to evaluate the effectiveness of various levels of aggressive thinning at eliminating BSRD or limiting the spread of BSRD from trees with latent infections or newly infected trees.

Based on all of the preceding, there is scientific evidence that supports controlling BSRD with the partial cuts proposed for the Heartrock area as long as the partial cuts achieve the BSRD management objectives listed above. This project should be considered a test of the hypothesis that an aggressively thinned pine forest is less likely to experience newly vectored BSRD, less impacted by BSRD tree-to-tree spread, less susceptible to bark beetle mortality and less likely to experience stand replacing fires than surrounding overstocked forests.

This experiment in BSRD suppression and prevention needs to be monitored over the next twenty years, or more, to evaluate the treatments against the stated objectives. Data on post-

harvest soil disturbance, tree injury and tree spacing needs to be recorded soon after the project is completed. Latent or new BSRD and its spread needs to be recorded and related to stocking and site conditions over time. Results need to be documented to guide future insect and disease management strategies for pine forests.

If you have questions or require additional information, please contact me.

WILLIAM C. WOODRUFF
Plant Pathologist

References

- Jacobs, K. and M.J. Wingfield. 2001. *Leptographium* Species: Tree Pathogens, Insect Associates, and Agents of Blue Stain. APS Press. 207p.
- Kliejunas, J. 1992. A biological evaluation of black stain root disease, Stateline Timber Sale area, Devils Garden Ranger District, Modoc National Forest. USDA Forest Service, Region 5 Forest Pest Management Report #R92-07, 8p.
- Owen, D.R. 2000. Black stain root disease of ponderosa pine in California. California Department of Forestry and Fire Protection Tree Notes # 25, 4p.